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I-7000

RS-485 DATA ACQUISITION AND CONTROL MODULES

- Distributed Data Acquisition and Control Modules.
  Control and Data Acquisition where you need it, as you need it.
- Standard baud rates up to 115.2 kbaud.
  Handles the highest speed serial devices.
- 3000 V Isolation
  Reduces noise, no ground loops.
- Read Analog Signals, temperatures or digital inputs. Control with analog outputs or contact closures. Select just the I/O Modules needed for your application.
- Easy network control module addressing.
  Control multiple modules on one network.
- Modules mount on standard DIN rail.
  Easy mounting and replacement.
- Power Adapter and DIN Rail included.
  Nothing more to buy.

CE Approved

Description

The I-7000 Series is a family of Data Acquisition and Control Modules that gives the user an easy way to build a distributed Data Acquisition or Control system. All modules are controlled over an RS-485 network at rates up to 115,200 baud. The Model I-7017 has 8 analog input channels. The Models I-7018 and I-7019 have voltage and thermocouple inputs. The Models 7022 and 7024 provide voltage and current outputs. The Model I-7060 has 4 digital inputs and 4 sets of relay contacts and 4 sets of relay contacts. The Model I-7067 increases the number of relay contacts to 7 sets. All units are designed for industrial applications with dual watchdog timers, fail safe outputs and have 3000 V isolation to the RS-485 network for noise free operation.

RS-485 Communication

The I-7000 series modules are controlled over an RS-485 network. RS-485 networks use a pair of differential signals for transmitting data and have a high degree of noise immunity due to their differential nature. Cable lengths can be up to 4,000 feet. The I-7000 communication protocol uses command packets with an address character and a checksum to validate the packet. All packets are acknowledged and erroneous packets are resent.



I-7017 Analog Module

The module address can be set from 01 to 255. All module configuration parameters such as address, baud rate etc. are saved in an internal EEPROM. D units have an optional 5 digit LED display.

I-7017

The I-7017's 24-bit sigma-delta A/ D converter reads 8 channels at a 10 channel per second rate. Input ranges can be set to +10 V, +5 V, +1 V, +500 mV, +150 mV and 0 to 20 mA. The 1-7017F has the same specifications but has a faster 75 samples per second sampling rate.

Popular I-7000 Configurations

Model	Description	Display
I-7017	8 ch diff Analog Input, mV/V, 10 s/sec	None
I-7017F	8 ch diff Analog Input, mV/V, 75 s/sec	None
I-7018	8 ch diff Analog Input, mV/V/thermocouple, 10 s/sec	None
I-7019R	8 ch diff Analog Input, mV/V/20mA/thermocouple, ESD	None
I-7022	2 ch Isolated D/A 12-bit, 0-20/4-20 mA or 0-10 Vdc.	None
I-7024	4 ch D/A 14-bit, 0-20/4-20 mA or 0-5/±5/0-10/±10 Vdc	None
I-7060	4 digital inputs, 4 sets of relay contacts	None
I-7067	7 sets of relay contacts	None

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I-7018

The I-7018's 24-bit sigma-delta A/ D converter reads 8 channels of voltage or thermocouple inputs. The module has a Cold Junction Compensation circuit and can handle virtually any type of thermocouple. Temperature range depends upon the thermocouple. Thermocouple types are: J, K, T, E, R, S, B, N, C, Voltage input ranges are from +2.5 V, +1 V, + 500 mV, +100 mV, +50 mV and +15 mV. The 1-7018P has the same specifications but also handles L and M thermocouples.

I-7019R

The I-7019R is a Universal Analog Input Module that can handle voltage, millivolt and thermocouple inputs. The I-7019 has 8 differential analog inputs with nine DC voltage ranges from ± 15 mV to ± 10 V. Also reads ±20 mA current. Resolution is 16-bits with an accuracy of ± 0.1 %. Channels are individually configurable and have 4 kV ESD protection. The I-7019R also handles most commercial thermocouples and includes a wire open detection logic. The thermocouple types are: J, K, T, E, R, S, B, N, C, L, M and L2. The following chart lists the thermocouple types and their temperature ranges.

Type	Code	Temperature Range °C
J	0E	-210 to +760
K	0F	-270 to +1372
T	10	-270 to +400
E	11	-270 to +1000
R	12	0 to +1768
S	13	0 to +1768
B	14	0 to +1820
N	15	-270 to +1300
C	16	0 to +2320
L	17	-200 to +800
M	18	-200 to +100
L2	19	-200 to +900

Note: L2 is DIN 43710

I-7022

The I-7022 provides 2 isolated analog outputs that can provide 0 to 10 V, 4 to 20 mA or 0 to 20 mA. Output channels have 3000 volts of isolation from each other and from the serial input. The output channels are independent and have individual range settings. Power on settings can be stored in the module's internal EEPROM.

7024

The I-7024 provides 4 isolated analog outputs that can provide ± 10 V, ± 5 V, 5 V, 10 V, 4 to 20 mA or 0 to 20 mA. Output channels share a common output type and range setting. Power on settings can be stored in the module's internal EEPROM.

I-7060

The I-7060 provides four isolated digital inputs and four sets of relay contacts. The digital inputs have a wide range of voltage inputs. Logic 0 is 0 to + 1 volt. Logic 1 is + 3.5 to + 30 volts. Digital inputs can be used as a 16 bit counter with rates up to 100 kHz. The four sets of relay contacts are two SPST (Form A) contacts and two SPDT (Form C) contacts. Both contact types are shown in the figure on the right. Contact ratings are a rugged 2 A at 30 VDC and 0.5 A at 115 VAC.



I-7060 Isolated Digital Input and Relay Module

I-7060D

The I-7060D adds 8 LEDs to the standard I-7060 to show the input signals and which relays are energized. The I-7060D with the LED display is shown in the photo below.



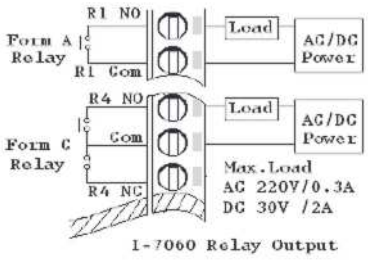
I-7060D Isolated Digital Input and Relay Module with Display LEDs

I-7067

The I-7067 provides seven sets of relay contacts. The relay contacts are rugged SPST (Form A) normally-open contacts. The contacts are rated for 2 A at 30 VDC and 0.5 A at 115 VAC. The Form A contacts are shown in the figure below.

I-7067D

The I-7067D adds 7 LEDs to the standard I-7067 to show which relays are energized.



I-7060/I-7067 Form A and Form C Contacts

Operation

INIT pin - Enables setting the module configuration parameters.

Power on Values - Set at power on or when Watchdog reset occurs.

Optional Display - Show the status of the module, its IP address and serial port configuration settings. Models with the display are noted with a D after the part number.

Serial Interface

RS-485 Interface is half-duplex. Protocol includes address and checksum.

Signals	TX/ RX pair
Baud Rates	Std Windows rates up to 115.2 kbaud.
Data Bits	7 or 8 bits
Parity	None, odd, or even
Stop bits	1 or 2
Distance	1200 M

DCON Protocol

DCON Protocol consists of commands generated by the host and responses transmitted by the I-7000 modules. Each module has a unique user-set ID number that is stored in nonvolatile memory. The command format is:

Leading Character	Address Character	Command	[CKSUM]	CR

See the I-7000 manual for specific module commands.

I-7017 Specifications

Channels	8 diff or 6 diff/ 2 SE
Input Ranges	±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V and ±20 mA
Rate	10 samples/ sec
Accuracy	± 0.1%
Zero drift	± 0.03µV/ °C
Span drift	25ppm/ °C
CMR	92 dB @50/ 60 Hz
Overvoltage	± 35V
I-7017F same specifications faster rate	
Rate	75 samples/ sec
Accuracy	± 0.5%

I-7018 Specifications

Channels	8 diff or 6 diff/ 2 SE
Input Ranges	±15 mV, ±50 mV, ±100 mV, ±1 V, ±2.5 V and ±20 mA
Rate	10 samples/ sec
Accuracy	± 0.05%
Zero drift	± 0.03µV/ °C
Span drift	25ppm/ °C
CMR	150 dB @50/ 60 Hz
NMR	150 dB @50/ 60 Hz
Overvoltage	± 35V
thermocouples	J, K, T, E, R, S, B, N, C (L and M -7018P only)

I-7019R Specifications

Channels	8 differential
Input Ranges	±15 mV, ±50 mV, ±100 mV, ±1 V, ±2.5 V ±5 V,±10 Vand ±20mA
Imput Imp.	20 Mohm for voltage
Resolution	16-bit
Accuracy	± 0.1%
CMR	86 dB @50/ 60 Hz
Overvoltage	± 35V
thermocouples	J, K, T, E, R, S, B, N, C, L and M
ESD Protestion	4 kV

I-7022 Specifications

Channels	2
Output Ranges	0-20 or 4-20 mA, 0-10V
Resolution	12-bit
Accuracy	± 0.1% FSR
Readback	± 1 % FSR
Zero drift	± 15µV/ °C ± 0.2 µA/ °C
Prog slope	0.0625 to 64 V/ sec 0.125 to 128 mA/ sec
Load	5 mA
Isolation	3000V

I-7024 Specifications

Channels	2
Output Ranges	0-20 mA, 4-20 mA, 0-10, 0-5, ±5, and ±10V
Resolution	14-bit
Accuracy	± 0.1% FSR
Readback	± 1 % FSR
Zero drift	± 15µV/ °C ± 0.2 µA/ °C
Prog slope	0.0625 to 64 V/ sec 0.125 to 128 mA/ sec
Load	5 mA

I-7060 Specifications

Relays	4
Contact type	2 SPST NO 2 SPDT
Contacts	125VAC @0.6A; 250VAC @0.3A 30VDC @2A; 110VDC @0.6A
Breakdown V	500 VAC at 50/ 60 Hz
Relay On Time	3 ms typ
Relay OFf Time	1 ms typ.
Digital inputs	4
Logic 0	0 to + 1 VDC
Logic 1	+3.5 to +30 VDC
Isolation	3750 V
Input Imp.	3 kohm

I-7060D Specifications

Same as the standard I-7060 and adds:

LEDs	4 for Digital Inputs 4 for Relay contacts

I-7067 Specifications

Relays	7
Contact type	SPST, Normally open
Contacts	125VAC @0.6A; 250VAC @0.3A 30VDC @2A; 110VDC @0.6A
Breakdown V	500 VAC at 50/ 60 Hz
Relay On Time	3 ms typ
Relay OFf Time	1 ms typ.

I-7067D Specifications

Same as the standard I-7067 and adds:

LEDs	7 for Relay contacts

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Physical

Size
123mm x 72mm x 33 mm
(without mounting bracket)

Mounting
DIN rail

Display (optional)
5 digit LED display or single LED

Connectors
Screw terminals for 16 to 26 AWG wires, 0.15 in centers

Isolation
3000 volts to serial I/ O standard
Channel isolation in some modules.

Temperature
Operating -25 °C to 75 °C
Storage -40 °C to 85 °C

Relative humidity
0 to 90% (not condensing)

Power consumption
1.3 W @10 to 30 Vdc (7017/ 18/ 19/ 60)
2.4 W @10 to 30 Vdc (7022/ 24)

CE Certification

EMC Directive 89/ 336/ EMC
Emission EN 55022
Noise immunity EN 50082-2C

Included Items

Single unit DIN rail
Manual on CD-ROM
UL/ CSA/ VDE approved AC power
Adapters provided for:
US - 115±10% Vac, 60 Hz (std)
Europe - 230±10% Vac, 50/ 60 Hz
UK - 230±10% Vac, 60 Hz

ORDERING INFORMATION

	Part Number
Input Module with 8 channels A/ D, 3000 V Isolation	I-7017
Input Module with 8 channels fast A/ D, 3000 V Isolation	I-7017F
Input Module with 8 channels A/ D for thermocouples, 3000 V Isolation	I-7018
Input Module with 8 channels A/ D for voltage and thermocouples, 3000 V Isolation	I-7019R
Output Module with 2 channels analog output, 3000 V channel to channel Isolation	I-7022
Output Module with 4 channels analog output. 3000 V Isolation	I-7024
Control Module with 4 sets of relay contacts and 4 isolated digital inputs	I-7060
Control Module with 7 sets of relay contacts	I-7067
For units with optional LED display add 'D' suffix. i.e. 7060 becomes 7060D.	
For 230 VAC adapter, add suffix to specify country/ plug style) -E(Europe), -B(UK), -A(Australia) i.e. I-7188E2-B	

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